REMARKS

Applicant cancels claims 2-4, 6, 8, 15, 19-21, 23, 25, 32, 41, 44, and 47-48. Claims 1, 5, 7, 9-14, 16-18, 22, 24, 26-31, 33-40, 42-43, 45-46, and 49-50 remain pending in the application. Applicant amends claims 1, 7, 9-10, 12-13, 16, 18, 24, 26-27, 29-30, 33, 35, 40, 45-46, and 49-50 for clarification. No new matter has been added.

Claims 6-17, 23-34, 38, 40, 44-46, and 48-50 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Applicant amends claims 9-10, 12-13, 24, 26-27, 29-30, 40, 46, and 50 to cure the antecedent basis problems noted by the Examiner. Applicant respectfully submits that antecedent basis is provided for the terms objected to by the Examiner, and requests that the Examiner withdraw the § 112, ¶ 2 rejection.

Claims 1-8, 18-25, 35-37, 39-40, 44 and 48-49 were rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2005/0172092 to Lam et al. Applicant amends the claims in a good faith effort to clarify the invention as distinguished from the cited reference, and respectfully traverses the rejection.

The claimed invention provides for accelerating I/O operations while providing an updated snapshot copy (of a production disk), whereas Lam et al. describe methods for generating a backup version of the data on a backup storage system. The differences between snapshot and backup of data are clearly described in the specification,

> "Backup and snapshot are two techniques for increasing data
> reliability in storage systems. A snapshot is a copy image of a file
> or a disk at a certain point in time. A file or the whole disk is
> copied, at regular time intervals, into the same storage device, or a
> different storage device, to create the snapshot. In case that data
> has been lost or corrupted, data is recovered by restoring the data
> in the snapshot copy created immediately before the occurrence of

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*the fault. Snapshot copies of a data set, such as files, are used for a
variety of data processing and storage management functions such
as storage backup, transaction processing, and software
debugging. A backup may be referred to as a copy of the snapshot
saved and stored on a different storage device (e.g., a tape drive)...*
" Paragraph [0003] of the specification.

The claimed invention provides for an updated snapshot copy without idling the hosts during the snapshot creation by <u>on-line</u> writing data to a journal and <u>off-line</u> updating the production and snapshot copies. The Examiner pointed to paragraph [0070] in <u>Lam et al.</u> to indicate that the method described therein also handles data snapshots. <u>Lam et al.</u> only describe, however, using a data snapshot for a reference point before performing disk migration and data replication. Therefore, <u>Lam et al.</u> do not teach any technique for creating, updating or maintaining snapshot.

*"...snapshot may be used, for example, to recover an earlier
version of the data in the event a current version becomes
corrupted. Similarly, to mitigate the risk that the data on primary
system 130 may become corrupted during the delta replication, at
step 842, storage manager 220 performs a snapshot of data stored
on primary storage system 130. From this point on, the <u>delta
replication is performed based on the snapshot</u> of data in primary
system 130..."* Paragraph [0070] of <u>Lam et al.</u>

<u>Lam et al.</u> describe a method of an asynchronous form of the continuous data backing. The off-line tasks performed in the method described in <u>Lam et al.</u> are different from those of the claimed invention. Specifically, since the method described in <u>Lam et al.</u> is designed to provide backup data, the off-line tasks include reading data saved in a staging storage device and saving the data to primary and backup storage systems,

*"... storage manager 220 reads the data item and the associated
metadata from staging storage device 213, and, at step 321, causes
the data item to be written to assigned locations in primary system
130 and in backup system 140..."* Paragraph [0053] of <u>Lam et al.</u>

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On the other hand, the secondary (off-line) tasks of the claimed invention relate to maintaining an updated snapshot copy. For this purpose, the specification includes an exemplary embodiment of a method that copies original data that resides in a production device to a snapshot device and a new data chunk is copied from a journal to the production.

Applicant respectfully submits that Lam et al., as cited and relied upon by the Examiner, fail to disclose,

> "[a] method for enabling the execution of I/O operations by at least a host on at least a production storage element while producing an updated snapshot copy of said production storage element, said method comprises the steps of:
> a) performing on-line a write request initiated by said host by writing a data chunk to a journal;
> b) generating a response message ending the execution of said write request and thereby handling said host to execute said I/O operations; and,
> c) off-line producing said updated snapshot copy of said production storage element," as recited in claim 1. (Emphasis added)

Accordingly, Applicant respectfully submits that claim 1, together with claims 5 and 7 dependent therefrom, is patentable over Lam et al. for at least the foregoing reasons. Claims 18 and 35 incorporate features that correspond to those of claim 1 cited above, and are, therefore, together with claims 22, 24, 36-37, 39-40, and 49 dependent therefrom, respectively, patentable over Lam et al. for at least the same reasons.

Claims 9-11 and 26-28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Lam et al. and the in view of U.S. Patent No. 6,434,681 to Armagau.

The Examiner relied upon Armangau as a combining reference to specifically address the additional features recited in dependent claims 9-11 and 26-28. As such, the combination of this reference would not have cured the above-described deficiencies of Lam et al. even assuming,

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arguendo, that such a combination would have been obvious to one skilled in the art at the time

the claimed invention was made. Furthermore, Armangau does not disclose or suggest copying

data from a journal to a production volume. This is a major drawback because writing data

directly to the production storage device introduces latency, as described in detail in paragraphs

[0013] and [0014] of the specification. Accordingly, Applicant respectfully submits that claims

9-11 and 26-28 are patentable over Lam et al. and Armangau, separately and in combination, for

at least the above-stated reasons.

Claims 12-17, 28-34, 38 and 42-47 were rejected under 35 U.S.C. 103(a) as being

unpatentable over Lam et al. in the view of U.S. Patent Application Publication No.

2005/0025045 to Shimozono et al., and further in view of U.S. Patent Application Publication

No. 2005/0076157 to Serizawa et al.

Again, the Examiner relied upon Shimozono et al. and Serizawa et al. as combining

references to specifically address the additional features recited in the rejected dependent claims.

As such, the combination of these references would not have cured the above-described

deficiencies of Lam et al. even assuming, arguendo, that such a combination would have been

obvious to one skilled in the art at the time the claimed invention was made.

Furthermore, Shimozono et al. only describe a switch installed between a computer and a

storage unit and utilized to avoid location of a buffer or a cache memory required for recovering

a path trouble in the conventional storage unit. The switch transfers data without the use of

cache or buffer.

> "... a switch for switching a path without having to use a buffer or
> a cache for transferring data or without having to add a new
> capability to the computer in a network of connecting the storage
> unit with the computer..." Paragraph [0174] of Shimozono et al.

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And <u>Serizawa et al.</u> describe a storage system that does not include cache or any equivalent memory from where a host computer reads data.

Therefore, <u>Shimozono et al.</u> and <u>Serizawa et al.</u> do not teach or suggest the claimed feature of reading data from a journal while maintaining an updated snapshot copy. Accordingly, Applicant respectfully submits that claims 12-14, 16-17, 28-31, 33-34, 38, 42-43, and 45-46 are patentable over the cited references for at least the above-stated reasons.

The above statements on the disclosure in the cited references represent the present opinions of the undersigned attorney. The Examiner is respectfully requested to specifically indicate those portions of the respective reference that provide the basis for a view contrary to any of the above-stated opinions.

Applicant appreciates the Examiner's implicit finding that the additional references made of record, but not applied, do not render the claims of the present application unpatentable, whether these references are considered alone or in combination with others.
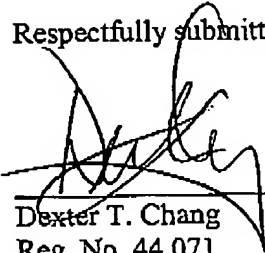
In view of the remarks set forth above, this application is in condition for allowance which action is respectfully requested. However, if for any reason the Examiner should consider this application not to be in condition for allowance, the Examiner is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

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Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

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